

Short Course on
ADVANCED COMPRESSOR MODELING
(COMPRESSORS 102)

Saturday, July 14, 2012 — 1:00 p.m. to 5:00 p.m.
Sunday, July 15, 2012 — 8:00 a.m. to 4:30 p.m.

Purdue University
Rawls Hall, Room 1086
West Lafayette, Indiana 47907

Sponsored and Organized by the Ray W. Herrick Laboratories

Main Organizers:

- Dr. Craig Bradshaw, Purdue University
- Prof. Eckhard Groll, Purdue University

Description

This short course will review and extend some of the modeling techniques developed during the 2010 compressor short course (Compressors 101). It will provide a detailed description of the mathematical modeling tools necessary to analyze positive displacement compressors. In particular, the short course will focus on hermetic scroll, rotary and reciprocating compressors. Sub-models for leakage, and frictional losses will be described in detail. An example of a compressor simulation model will be made available to the course participants. Parametric studies will be performed to investigate the impact of variation in geometric parameters on the compressor performance. In addition, connections to manufacturing capabilities, system level considerations, compressor motors, and lubrication are also presented.

Objectives

The objective of the short course is to provide a broad exposure to the important design characteristics of positive displacement compressor technologies that are used in vapor compression applications. The compressor range of use and performance will be discussed in detail for several different refrigeration, air conditioning and heat pumping applications. In addition, the modeling techniques used to describe these technologies are explored and exercised to determine the proper application.

Speakers:

Purdue PhD Dr. Ian Bell, Bell Thermal Consulting

- Dr. Nasir Bilar, Purdue University
- Dr. Craig Bradshaw, Purdue University
- Prof. Eckhard Groll, Purdue University
- Prof. Travis Horton, Purdue University
- Joe Karnaz, CPI Eng., USA

Purdue PhD Prof. Margaret Mathison, Marquette University

- Joe Orosz, Torad Engineering, LLC

He will present Dr. Bryce Shaffer, Air Squared Inc., USA

- Dr. Peter Wung, Regal Beloit Corp. Enabling Technology-Commercial., USA

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Schedule:
Saturday, July 14

Noon – 1:00 pm	Registration	
1:00 – 1:10 pm	Welcome, Introduction, and Overview – Dr. Craig Bradshaw, Purdue University	
1:10 – 1:40 pm	Overview of Compressor Technologies and their Applications – Prof. Eckhard Groll, Purdue University	1
1:40 – 3:10 pm	Overview of General Compressor Analysis – Dr. Ian Bell, Bell Thermal Consulting; Dr. Craig Bradshaw, Purdue University; Prof. Margaret Mathison, Marquette University.....	2
3:10 – 3:30 pm	Coffee Break	
3:30 – 4:00 pm	Variable Wall Thickness Scroll Geometry Model – Dr. Bryce Shaffer, Air Squared, Inc.....	3
4:00 – 5:00 pm	Developing a comprehensive compressor model using PDSim – Dr. Ian Bell, Bell Thermal Consulting	4
5:00 pm	Adjourn	

Sunday, July 15

7:30 – 8:00 am	Continental Breakfast	
8:00 – 8:10 am	Logistics for the day – Dr. Craig Bradshaw, Purdue University	
8:10 – 9:10 am	Sensitivity Analysis of a Comprehensive Compressor Model Applied to a Reciprocating Compressor – Dr. Craig Bradshaw, Purdue University.....	5
9:10 – 9:30 am	Coffee Break	
9:30 – 10:15am	Manufacturing of Compressors – Joe Orosz, Torad Engineering, LLC	6
10:15 – 11:00 am	Vapor and Liquid Injection– Prof. Margaret Mathison, Marquette University.....	7
11:00 – 12:00 am	System Level Compressor Design Considerations – Prof. Travis Horton, Purdue University.....	8
12:00 – 1:00 pm	Box Lunch	
1:00 – 2:00 pm	Motors for Compressors – Peter Wung, Regal Beloit Corp.	9
2:00 – 2:30 pm	Utilizing Lubricant-Refrigerant Interaction Data for Compressor and System Design – Joe Karnaz , CPI Engineering.....	10
2:30 – 2:50 pm	Coffee Break	
2:50 – 3:20 pm	Gas Pulsations in Reciprocating Compressors – Dr. Nasir Bilal, Purdue University	11
3:20 – 4:20 pm	Novel Compressor Technologies – Prof. Eckhard Groll, Purdue University	12
4:20 – 4:30 pm	Closure, Course evaluations, Dismiss for Herrick Labs Tour	
4:30 – 5:30 pm	Herrick Labs Tour	

Tals#